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Driving collaborative innovation to solve complex energy challenges by integrating AI, advanced computing, data science and domain expertise.

- ◆ Co-leading data strategy for the DOE's Genesis Mission
- ◆ Founding Technical Director of NETL's Science-based AI/ML Institute (SAMI)
- ◆ Founder of NETL's geo-data science research team (GAIA Group)
- ◆ Architect of DOE's Energy Data eXchange® (EDX)



National Initiative for Science, National Security, and Innovation

***Mission Goal:** Use artificial intelligence to dramatically accelerate American scientific discovery and **strengthen** U.S. economic and national security leadership.*

The Challenge

A global race amidst a revolution in computing

- Modern AI is bringing a completely new way to conduct science
- Nations compete to transform the speed and quality of scientific achievement
- We must deliver world-changing scientific AI capabilities targeted at the nation's most critical science and security needs

The Solution

A portfolio of National Science and Technology Challenges delivered by an integrated AI-driven platform

- National Challenges define where the US must lead in science, energy, and national security
- The American Science and Security Platform uses AI to combine federal data, computing, laboratories, and facilities into an exquisite, unified discovery instrument
- Automates and accelerates research, experimentation, and engineering
- Keeps **humans in control** while removing workflow bottlenecks

What This Delivers

- **Faster results:** 10–100× acceleration in priority science and engineering domains
- **Stronger security:** AI-enabled solutions and threat mitigation in high-consequence missions
- **Better returns:** Multiplies impact of existing federal R&D investments
- **U.S. leadership:** Technological superiority across the globe

Close industry partnerships, delivered by the **partnerships team**, will enable rapid platform development and ensure meaningful application impact





The Genesis Mission is organized around two concepts

The National Science and Technology Challenges

The **National Challenges** are high-impact technical problems aligned to urgent national priorities – where AI can dramatically accelerate progress. They demand AI model, data, computing, and automation capabilities unified in a single solution platform. Expert teams develop innovative solutions while results strengthen and extend the platform itself to tackle ever more ambitious challenges.

Delivered by the National Challenges team through the platform.

<https://www.energy.gov/articles/energy-department-announces-26-genesis-mission-science-and-technology-challenges>

The American Science and Security Platform

The **platform** supports AI-driven experimentation, analysis, discovery, design, and manufacturing. It unifies access to AI, computing resources, scientific data, and automated facilities, allowing application of unprecedented capabilities. It delivers scientific self-improving feedback that will accelerate R&D in the energy dominance, discovery science, and national security pillars.

Delivered by the infrastructure, data, and models teams.

Close industry partnerships, delivered by the **partnerships team**, will enable rapid platform development and ensure meaningful pillar impact



The mission technical efforts are organized into five teams/pillars



National Challenges

Engages with projects addressing high-impact national challenges—such as energy security and advanced materials—that are accelerated by the platform. Serves as a living portfolio that evolves as goals and technologies change.



Infrastructure

Provides hardware and software foundations to support large-scale AI training and inference, data management, and scalable agentic workflows. Ensures security of models, data, and systems and interoperability across DOE facilities and production agencies.

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Data

Organizes, curates, and prepares scientific and engineering data from experiments, simulations, and observations for AI use. Ensures high-quality, reliable data to accelerate discovery and problem-solving.



Models

Develops an AI ecosystem of **agents** and **models** that combines frontier industry capability with DOE-specific expertise to discover and implement novel solutions to the nation's open science and technology challenges.



Partnerships

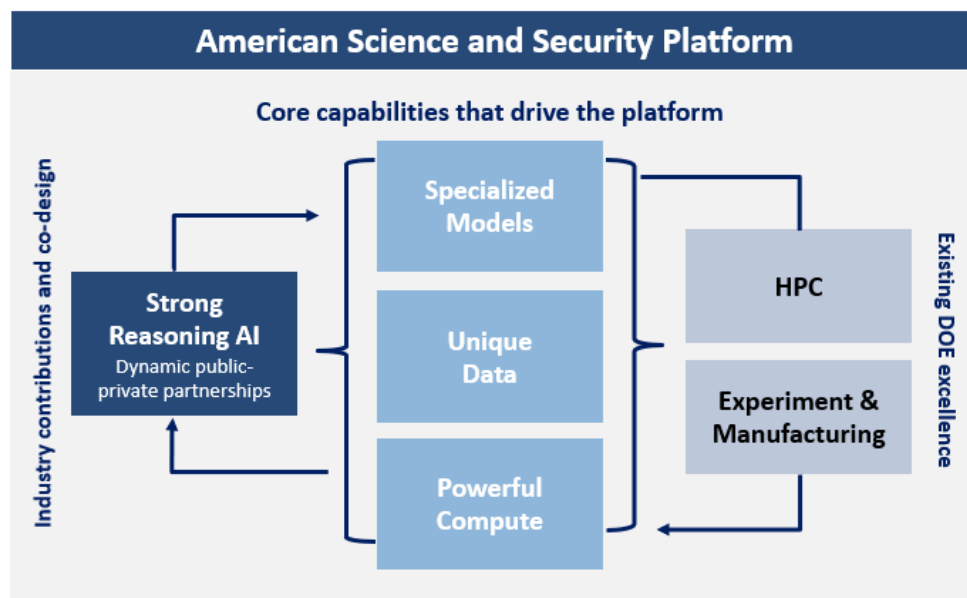
Builds collaborations across government, industry, and academia to advance AI innovation. Leverages shared expertise and resources to deliver real-world impact at national scale.



The Genesis Mission platform will accelerate innovation and production across missions

The platform is:

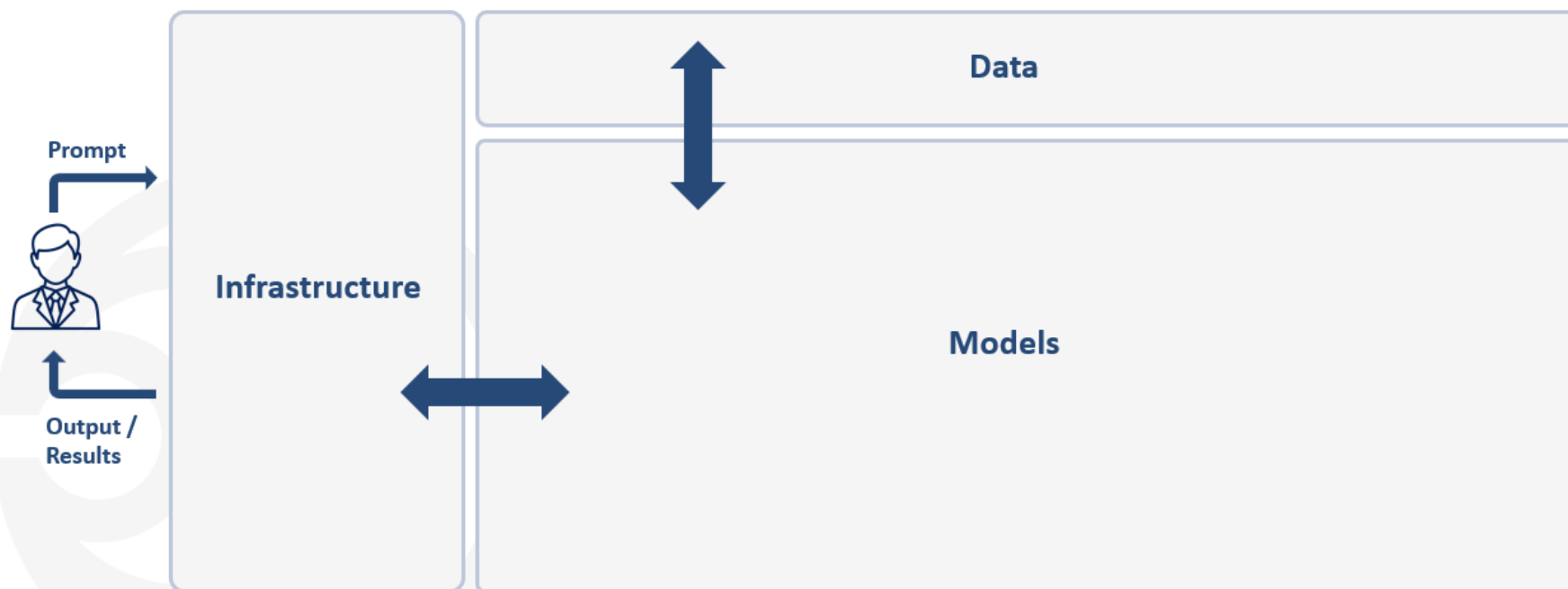
- A singular, integrated AI engine
- Built to harness high-performance computing, precision experimentation, and high-consequence production
- Designed for AI-driven discovery and rapid, novel mission solutions



The platform is how we will attack our National Challenges

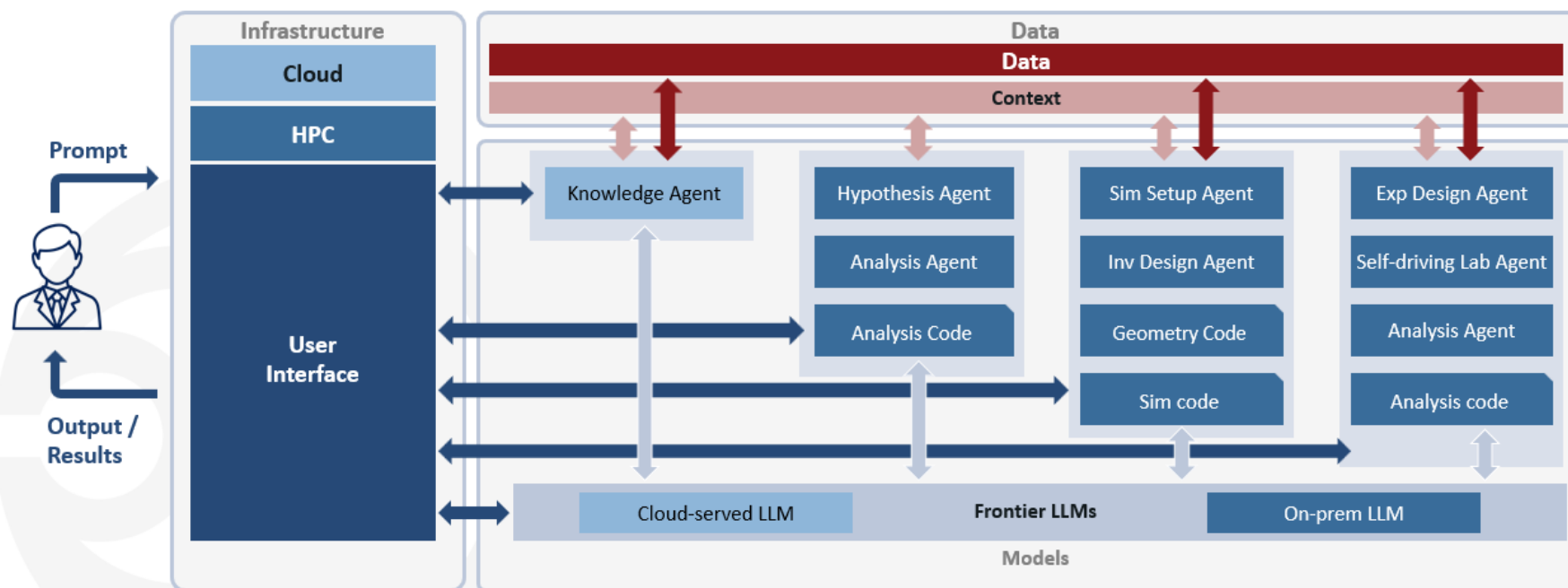


The teams are building the interacting components that will drive the platform



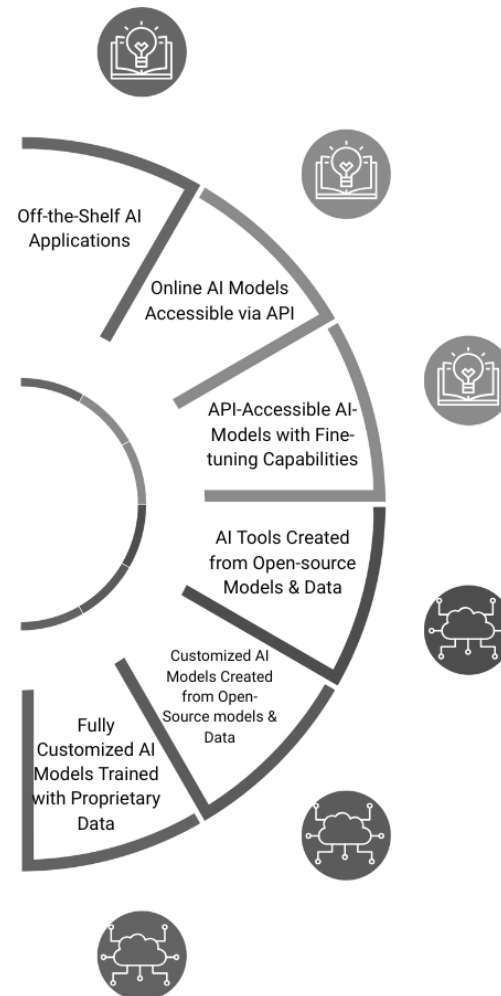


Each team provides a collection of subcomponents that interoperate to enable new workflows



These Genesis Mission elements are scalable –

A spectrum of innovation, acceleration opportunities adaptable for domain applications.



- Enable Task Efficiency
- Every Type of Employee Benefits

- Enable Advanced Research & Development
- Researchers and Data Scientists Benefit

- Enable New Research and Development Outcomes
- Expert Researchers and Data Scientists Benefit

Acknowledgements



Genesis Mission

<https://energy.gov/genesis>



U.S. DEPARTMENT
of **ENERGY**

Thank you